

**NOAA-NATIONAL MARINE FISHERIES SERVICE**  
**SOUTHEAST FISHERIES SCIENCE LABORATORY IN CHARLESTON**  
**FY94 SIGNIFICANT ACCOMPLISHMENTS**  
**MARINE BIOTOXINS PROGRAM**

New receptor-based assays for domoic acid and PSP toxins have been found to be useful for detecting toxins in algae, shellfish, crab hepatopancreas, and the serum of exposed humans and animals. These high capacity assays formatted to contain 96 data points on a 3 x 4" filter card provide rapid reliable results and detect all toxin congeners in a manner quantitatively proportional to their toxicity. These assays are anticipated to be used in dock side testing and confirmation of marine toxin exposure in humans and marine animals.

The immediate response gene c-fos has been utilized to map the neuronal pathways activated by marine toxins in laboratory animals. Using this approach two major brain regions have been identified to be the targets of domoic acid poisoning; the hippocampus which controls memory processing and the nucleus solitarius which regulates gastrointestinal function. The hippocampus was determined to be irreversibly damaged by this toxin whereas the nucleus solitarius is not. Analogous studies with ciguatoxin have indicated that this toxin activates the medial preoptic region of the brain controlling thermoregulation. These studies are being used to better assess the risk of marine toxins to seafood consumers.

Two new molecular forms of maitotoxin have been purified from a Caribbean strain of the toxic algal *Gambierdiscus toxicus* using solvent/solvent partitioning, size exclusion chromatography, and reversed phase HPLC. <sup>1</sup>H NMR determined that these maitotoxins have an eight member ether ring and differ by the presence of a single hydroxyl group. API ionspray mass spectrometry identified a mass of 3500 to 3600 daltons and similar fragmentation spectra to the B portion of the Pacific form of maitotoxin. These studies are providing the groundwork for the production of these much needed toxin standards.

The marine biotoxins analytical response team responded to two suspected toxic algal blooms this past year in the United States. *Gymnodinium sanguineum* was identified in a Gulf of Mexico red tide bloom in mid May that was associated with widespread mortality of marine life. However little or no toxicity was found in this algal. In February, a toxic algal bloom occurred the 5000 gallon coral reef microcosm of the Pittsburgh Zoo containing over 800 species of Caribbean marine organisms. *Gambierdiscus toxicus* was identified and determined to produce ciguatoxin activity responsible for the toxicity to many of the coral reef fish. The bloom is believed to have arisen from resting cysts associated with collected specimens and initiated by the drop in water temperature during the severe weather of this past winter.